

# CarbAI(TM) Based Thermal Management for Space Flight Systems Application, Phase I

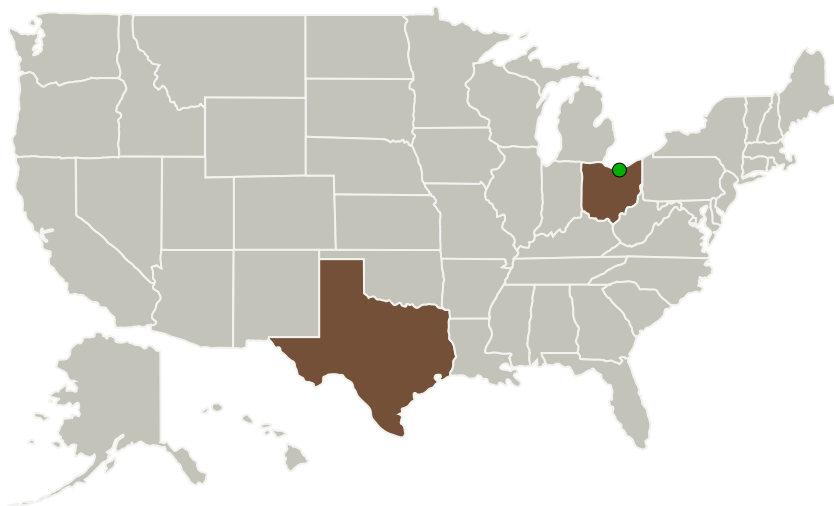
Completed Technology Project (2013 - 2013)



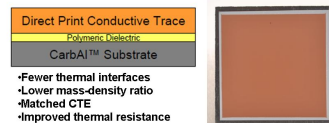
## Project Introduction

Thermal Transfer is a critical part of power electronics application in both terrestrial and space environments. Due to longer lifetime expectancies and harsh operational conditions, space vehicles require unique materials to deal with the increasing electrical and thermal loads placed upon the structure. Increasing use of power electronics including high current carrying semiconductor devices such as IGBTs, MOSFETs, power transistors, and modules drive the need for specialty thermal management materials both in the packaging of the discrete devices as well as for the packaging of modules consisting of several or arrays of these devices. The overall objective of this program (Phase I and Phase II) is to adapt CarbAI(TM)-based advanced thermal management substrates from terrestrial to space applications. CarbAI(TM) is a carbon-based thermal composite with a thermal performance exceeding that of many metals. The low CTE provides excellent matching to state-of-the-art power transistor dies and the low density and robustness make it suitable for space vehicle applications. The proposed Phase I program is a continuation of the materials development completed internally at ANI. If successful, the technology developed through this project will provide and accurate, robust, reliable and cost effective.

## Primary U.S. Work Locations and Key Partners



ANI's CarbAI™ Thermal Base plate



- Fewer thermal interfaces
- Lower mass-density ratio
- Matched CTE
- Improved thermal resistance

## CarbAI(TM) Based Thermal Management for Space Flight Systems Application

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Organizations Performing Work	Role	Type	Location
Applied Nanotech, Inc.	Lead Organization	Industry	Austin, Texas
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Texas

## Project Transitions

**May 2013:** Project Start**November 2013:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140455>)

## Images

**Project Image**

CarbAI(TM) Based Thermal Management for Space Flight Systems Application  
(<https://techport.nasa.gov/image/127521>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Applied Nanotech, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

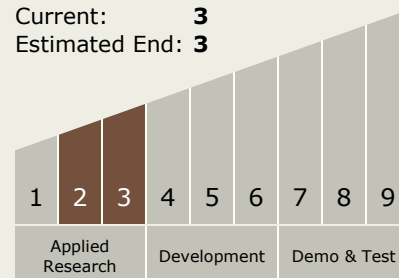
Carlos Torrez

**Principal Investigator:**

James R Novak

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



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## Technology Areas

### Primary:

- TX14 Thermal Management Systems
  - └ TX14.2 Thermal Control Components and Systems
    - └ TX14.2.2 Heat Transport

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System